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1946

JUST OUT

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INTERNATIONAL BULLETIN
OF PLANT PROTECTION

Year XX September & October 1946 Nos. 9 & 10

A MOSAIC DISEASE OF THE ALMOND *

On visiting almond groves in Bari Province I was surprised to see, on examining even isolated almond trees, that these trees frequently showed more or less evident foliar anomalies.

The phenomenon consisted in a spotting of the leaves caused through the existence of zones having a colour different from the normal characteristic green. This difference in colour would range from a simple paling of the green colour to yellow and sometimes even to white.

The shape and size of these zones varied greatly as also did their number and distribution on the limb.

In the full grown leaves, the contrast between the chlorotic areas and the variegated ones was clearly evident, but in the younger leaves the contrast was less accentuated.

Spotting was irregularly distributed ; it was evident both in the central zone, at the base or the extremity of the limb, and along the nervures or in the marginal parts of the leaf. On examining a certain number of leaves, I found that most of the spots began in a punctiform manner ; subsequently they increased in size and at the same time there was a more marked contrast in colour. This modification occurred even when the bud was not yet quite open. The newly opened leaves already showed tiny discoloured zones. These were the zones which later, when the leaf became green, acquired an abnormal pigmentation, the contrast in colour increasing with the age of the leaf.

As well as spotting, which is the most evident phenomenon, I frequently noted folding and contraction of the leaves.

Towards the end of June, many leaves had turned completely yellow and fallen to the ground. Those which at this time, although attacked, have not arrived at the point of shedding, re-acquire a normal colour and end by having, at least in appearance, an entirely healthy aspect with no sign of the early disorder. Consequently, those who have not noted the leaffall,

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* Communication from Signorina Nia SCARAMUZZI, Institute of Plant Pathology of the University of Bari, Italy.

which sometimes affects up to a third of the entire foliage, may think that the almond trees have not suffered any attack during the previous vegetative period.

This fact, which is already of particular interest, becomes even more so with the coming of the first cold weather; in effect, towards September, the leaves again become spotted and sometimes to an even more marked extent.

The most diseased leaves are most frequently found on the outer rim of the foliage so that in the most seriously attacked trees, at first sight the extremities of the branches appear completely yellow.

Not all the branches are attacked to the same degree, the intensity of spotting varying from branch to branch.

In general the diseased trees are grouped together in specific zones. A diseased tree is practically bound to be surrounded by other plants more or less affected.

In regard to the resistance of the different varieties of almond to this disorder, I found, after preliminary observations, that *numerous varieties were attacked, but not all to the same extent.*

At Andria for example, the ' Montrone ' variety was very severely attacked, while the ' Fra Giulio ', ' Occhio rosso ', ' Mandorla di Canosa ', ' Spineta ', ' Santoro ' and ' Mandorla bianca ' varieties were attacked to a lesser degree, and the ' Tuono ' variety but slightly. Other varieties appeared to me to be always free from this disorder, for instance, ' Rachele ', ' Scagliona ', ' Mincaccetta ' and ' Mandorla amara '.

At Barletta, the phenomenon was evident on the ' Tuono ' or ' Trono ' variety.

At Noicattaro, the ' Bianca ', ' Belerda ' and ' Noce ' varieties were very badly infected, while the ' Giotta ' and the ' Nocella ' were less severely attacked.

In the environs of Bari I found plants of the ' Cristomorto ' and ' Montrone ' varieties affected by the disease.

An examination of each variety shows that :

(1) The oldest varieties prove in different instances to be the most susceptible to the disease.

(2) The hardiest varieties, on the other hand, are the least easily attacked.

(3) Productivity and nut yield are less in the receptive varieties.

(4) Short ramification with abundant flower buds is more frequent in the attacked varieties.

Histological examination of sections of both fresh leaves and leaves fixed in paraffin wax, showed in the palisade-tissue a difference between the healthy and the chlorotic zones. The palisade-tissue in the healthy zones was formed normally by elongated cells arranged in several layers. That of the chlorotic zone, on the contrary, was formed of crushed cells arranged without order in a smaller number of layers. Compared

with the cells of the healthy parts, those of the diseased parts were hypoplastic, and the normally constituted portion was gradually invaded.

The deformation and curling of the leaves are due to the mechanical stress which occurs as a result of the difference in relative development of the tissues.

The difference in the number of chloroplasts between the green and the chlorotic parts is very marked and there must be a corresponding lower assimilative activity.

In chlorotic leaves which have returned to normal during the warm season the number of chloroplasts appears normal. This is to say that no difference is noted between the part which was formerly chlorotic and that which was always green. It would appear, therefore, that there is a regeneration of the chloroplasts due to the temporary inactivity of the causes which produced the disorder.

With a view to determining the possible causes of the disorder, I first of all subjected, for a year, a group of plants to an effective insecticidal treatment using 'Neodendrin', 'Nicol' and arsenates in order to exclude any direct action by insects since, as it is well known, their punctures may cause symptoms similar to those revealed by the almond trees in question.

From the above data and facts I came to the conclusion that the spotting I observed on the almond was to be attributed to a form of mosaic disease probably produced by a virus.

Bibliographical research on this disease showed me that actually very few authors speak of a spotting of the almond.

Mention was first made by REED and THORNBERRY (*Phytopathology*, 25, 1934) who had discovered a mosaic disease of the peach, almond and plum in California. In subsequent years COCHRAN and HUTCHINS closely studied this disease; they proved that it was produced by a virus. In a conclusive publication (*Phytopathology*, 28, 1938) these investigators state that the incubation period for almond mosaic disease may be as long as 3 years. It can be transmitted by grafting equally well to the almond, peach and apricot. The characteristics of the disease agree with those which I observed, both as regards symptoms and the seasonal appearance of the mosaic and defoliation.

Lastly, mention may be made of CHRISTOFF (*Phytopathologische Zeitschrift* 21, 1938), who describes an identical mosaic disease of the almond also transmissable to the peach, apricot, apple and pear, and which he himself observed in Bulgaria and at Spalato.

I grafted almond branches onto the peach and apricot in order to ascertain any eventual effectiveness of the mosaic disease in question. I also made another series of graftings on the almond. These latter were made at Rome in the experiment field of the Plant Pathology Station, that is to say in an environment entirely different from that of Bari and where this disorder has never been observed.

At Bari, in the spring of 1943, the graftings on the peach budded and the leaves showed the characteristic mosaic symptoms; this was also the case for the graftings made in Rome.

It may be concluded from these experiments that the factor which determines this mosaic may be considered as occurring inside the tissues of the plant, and consequently this would also justify the hypothesis that the mosaic disease of the almond which I observed could also be included among virus diseases.

On the other hand, however, I was unable to ascertain the infectiveness of the sap of diseased plants which I inoculated into healthy plants, or that the disease spread from the scion to the stock in the case of grafted plants, because my investigations were interrupted by the war.

TWO DISEASES RECORDED FOR THE FIRST TIME IN SOUTHERN RHODESIA *

Within the last twelve months, two diseases, late blight of potato (*Phytophthora infestans*) and Grauville wilt of tobacco (*Xanthomonas solanacearum*) have been recorded for the first time in the country. The former has done no serious damage and the latter is confined to two closely situated farms.

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* Communication of the official correspondent of the International Institute of Agriculture, Dr. J. C. HOPKINS, Senior Plant Pathologist, Department of Agriculture, Salisbury, Southern Rhodesia.

FACTORS WHICH LOWERED THE ARGENTINE WHEAT YIELD IN 1945 *

An investigation on this subject was carried out by the Department of Phytopathology as well as by the regional Laboratories of Phytopathology at Pergamino and Córdoba attached to the Ministry of Agriculture.

The results show that several factors of a climatic and parasitic nature played a part in lowering yield, primarily the drought from which the grain belt suffered. The cause of this loss should be attributed not only to the reduction in area cultivated, but also to the delay in growth which was particularly marked in the early varieties ('Sinvalocho M.A.', '38 M.A.', etc.). These eared late and were exposed to a greater extent than the others to *Puccinia graminis* and *Fusarium graminearum* infection.

At the beginning of spring and before the rains in the Pergamino region, the wheat which was in the milky stage started to acquire the 'arrebatado' aspect characterized by the formation of large tufts of mature plants with white ears. Finally the phenomenon became general and the wheat fields showed a premature and abnormal maturity.

At the same time could be seen preliminary attack of *F. graminearum*, which occurs every year during the earing period and which was easily recognized by the irregular white colour of the ears.

In 1945 the environmental conditions favoured fungus attack first at the foot and then in the roots of the plant. This form of infection, practically unknown in the country, was, however, observed on wheat from the 'Instituto de Fitotecnia de La Estanzuela', Uruguay, where the disease was serious; subsequently also the ears were attacked. The damage caused by *F. graminearum* combined with that produced by *P. graminis* which became widespread in November. *Fusarium* has the same effect as *Puccinia*.

This *Fusarium* also attacks maize, and the damage is much more pronounced in fields where the two cereals are grown in rotation. On the other hand, to prevent future attacks, it should not be forgotten that the fungus winters in the stubble or that it can be introduced into the soil with the seed at the time of sowing.

This investigation also revealed that the phenomenon of wheat 'arrebatado' and sunburn can be confused with *F. graminearum* attack when the latter is localized at the foot of plants which have begun to ear.

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* Communication from the official correspondent of the International Institute of Agriculture, Sr. JUAN B. MARCHIONATTO, agricultural engineer, Plant Protection Institute, Ministry of Agriculture, Buenos Aires, Argentina.

COLORADO BEETLE INFESTATION IN PIEDMONT, ITALY IN 1945 *

The presence of the Colorado beetle (*Leptinotarsa decemlineata* Say) in Piedmont has already been officially reported (see this *Bulletin*, 1945, Nos. 11-12, pp. 89-90).

The following are supplementary details : —

The Colorado beetle appeared in different localities in 1944, but owing to German occupation and the war conditions prevailing in the region, several foci were not reported, and in the case of those that were reported thorough control treatment was not possible. Consequently the insect, which was able to breed without check, reappeared in large numbers in the spring of 1945, rapidly spreading over a large part of Turin Province and establishing new foci in the neighbouring provinces. Immediately after the liberation of North Italy it was possible to start campaigning and organizing control measures which were made obligatory for the province of Turin by prefectoral ordinance.

Treatments consisted of arsenical sprays and dusts repeated at certain intervals ; the best results were obtained with lead arsenate.

The warm and dry weather favoured the development of the parasite, but it also assisted the arsenical treatments.

In Turin Province the Colorado beetles started to emerge in mid-April ; they were particularly numerous during the first fortnight of May ; larvae of the first generation appeared from the end of May to the end of June ; in July the insects of the first generation and subsequently the larvae of the second generation up to the end of August ; in September there were many insects of the second generation part of which produced larvae of the third generation ; these latter, however, did not succeed in completing their development owing to the cold and lack of nourishment. Consequently, the adults of the second generation wintered underground.

It was observed that even egg-plants are heavily attacked by the Colorado beetle, especially towards the end of August and in September, particularly as in Turin Province potatoes are lifted about the middle of August up to the end of that month, with the result that the insect is deprived of its favourite food ; the damage caused to egg-plants, if treatments are not effected, is also considerable. On the other hand, tomatoes are attacked very little and peppers are hardly touched.

As regards the dissemination of the insect, it was found that the Colorado beetle has spread like an oil stain throughout practically all the province of Turin ; from there the insects spread to the neighbouring plain and later filtered into the principal Alpine valleys.

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* Communication from Prof. G. DELLA BEFFA, Director of the Experiment Laboratory of Phytopathology and the Observatory for Plant Diseases, Turin, Italy.

Towards the end of the 1945 summer, some foci, probably started by insects brought on transports, appeared in the neighbouring provinces, for which a prefectoral ordinance rendering control measures obligatory will be drawn up immediately.

The following are the communes found to be contaminated at the end of autumn in 1945 : —

Turin Province : Almese, Alpignano, Balangero, Beinasco, Borgaro, Bruino, Brusasco, Buttigliera, Cafasso, Carmagnola, Caselle, Chiusa, S. Michele, Collegno, Condove, Druent, Gassino, Giaveno, Moncalieri, Nichelino, Orbassano, Pianezza, Rivoli, Rosta, S. Antonino di Susa, San Maurizio Can. Santena, Settimo, Torino, Torre Pellice, Villarbasse, Villarfocchiardo, Villar Perosa.

Coni Province : Ceva, Bagnasco, Garessio, Saluzzo.

Aosta Province : Castellamonte, Cuceglio, Ivrea.

Vercelli Province : Cossato Biellese.

Alessandria Province : Castellazzo Bormida.

In general, although 1945 was the first year of actual invasion into a large part of the province of Turin, no appreciable damage to the potato crop was reported, because owing to the campaigning and defensive organizing immediately put into effect, arsenical treatments were applied in time. Campaigning and defensive organizing will be intensified in 1946 and extended to all the provinces of Piedmont ; all the other Italian provinces will be kept informed so that they may be prepared for the eventual appearance of the parasite.

THE COLORADO BEETLE IN FRENCH SWITZERLAND *

Situation on August 1, 1946.

In July 1946 the Colorado beetle (*Leptinotarsa decemlineata*) followed its normal trend. In the low-lying and warm regions, perfect insects of the summer generation were seen beginning to emerge from the ground. With treatments and the unfavourable weather in June this emergence was not so important as expected. On early potatoes in dry and hot districts, fairly well advanced, there was little oviposition and the number of perfect insects diminished rapidly. On late potatoes, however, eggs were laid throughout the month with subsequent hatching out of larvae necessitating a late treatment during the first fortnight of August. This treatment is indispensable if the number of insects lasting over the winter is to be reduced and if severe attack on potatoes planted in 1947 is to be avoided.

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* Communication from the Federal Experiment and Seed Testing Station, Lausanne, Mont Calme, Switzerland.

No swarms of fully developed insects carried by the wind were reported, except by the shores of Neuchâtel Lake where there was a brief renewed outbreak of the parasite as a result of the stormy days at the beginning of the month with squalls from the west and where fishermen saw a swarm over the lake into which some of the insects fell.

All the products used against the Colorado beetle proved effective. By their rational use severe damage to crops was prevented.

In conclusion it may be noted that, in Geneve Canton, serious damage was caused to egg-plants, and that only dusts containing rotenone, Gésarol or Toxaline can be used in this case, as arsenicals are definitely to be avoided.

The parasite is now widespread in the Cantons of Geneva, Neuchâtel and Vaud and also in the Bernese Jura. Friburg Canton is also contaminated except for some communes in the fore-Alps. Valais is heavily invaded in the lower part of the Rhône Valley ; the lateral valleys and the Conches Valley are apparently still practically free from the parasite.

Situation on October 1, 1946.

Weather conditions during August, 1946 were somewhat abnormal. The first ten days of the month were warm and dry with hardly any wind or storms. This period was suddenly followed by cold and wet weather which continued over the first third of September. The temperature at night dropped considerably, even in the plain, and attained a minimum, at Geneva, of 8°C. Since then, during the last two thirds of September, the diurnal temperature was very high, but the nights were still cold with heavy fall of dew. The evolution of the Colorado beetle was naturally affected by these special conditions.

During the first six days of August, chiefly in the plain, emergences of perfect insects of the summer generation, retarded by the June rains, continued gradually. They were numerous in the fields where treatments were badly carried out. With the rains of the last twenty days of August and the first ten of September, the emergence of perfect insects was irregular. Hindered by the weather, in general oviposition was infrequent, and in many areas the eggs did not appear to have developed. Owing to the rapid drying up of many potato fields due to a severe attack of mildew (*Phytophthora infestans*) and the cold nights, egg-laying ceased rather rapidly. As early as the end of August, frost appeared in the high-lying regions and the Colorado beetles in the full-grown stage rapidly disappeared, probably killed off by the low temperature. At the end of September, in the plain districts, practically no more larvae were found, although perfect insects varying in number, were noted, mainly on late potatoes.

Already at the end of August it was reported that fully developed insects were attacking the epidermis of potato tubers the hulms of which were withered.

Prior to the hibernation period, therefore, in certain regions of the plain there are to be found perfect insects derived mainly from the summer generation which are about to burrow into the ground to emerge next year.

Late treatments which could not be carried out normally owing to the bad wheather in August have been partially compensated by natural conditions which checked the normal development of the larvae of the second generation.

LEGISLATIVE AND ADMINISTRATIVE MEASURES

England and Wales * — With the object of preventing the introduction of the cherry fruit fly [*Rhagoletis cerasi*] into England and Wales, the Minister of Agriculture and Fisheries has made the Importation of Raw Cherries Order of 1946 (S. R. and O. 1946 No. 651) under the Destructive Insects and Pests Acts, 1877 to 1927, affecting the importation of any cherries for which the necessary import licences are issued by the Board of Trade. Cherries grown in France will be admitted until May 27th, 1946 if accompanied by a certificate of origin but not after that date unless certified to have been grown within a small district around Honfleur. Cherries grown in other countries will be admitted if accompanied by a certificate of origin or under special licence issued by the Minister according to the place of origin.

The Order operates from May 19th to September 30th, 1946.

Belgium. — By Decree of June 8, 1946 the capture of sparrows, by means of the draw-net known as 'tirasse', to the exclusion of all others, is authorized up to September 15, 1946 inclusive, throughout the country. (*Moniteur belge*, Bruxelles, 24-25 juin 1946, 116e année, nos 175-176, p. 5409).

India † — The Government of India has decided to establish a Bureau of Plant Protection and Quarantines in India on the model of the United States of America with head quarters at New Delhi. The Head of this Organisation will be Plant Protection Adviser to the Government of India, Department of Agriculture, New Delhi. This Organisation is to take steps mainly in the following directions : —

(*i*) Prevention of foreign pests and diseases by sea, land or air routes.

(*ii*) Regulating inter-provincial movements of plant materials with a view to stop the spread of obnoxious pests and diseases.

(*iii*) Eradication and control of pests and diseases which already exist in the country.

* Communication of the Ministry of Agriculture and Fisheries, London, to the International Institute of Agriculture.

† Communication of the official correspondent of the International Institute of Agriculture, Dr. H. S. Pruthi, M. Sc., Ph. D. & Sc. D. (Cantab.), FRASB., FNI., Plant Protection Adviser to the Government of India, New Delhi.

Italy. — By Legislative Decree of the Lieutenancy No. 316 dated May 4, 1946, a credit of 500 million lire has been placed at the disposal of the Ministry of Agriculture and Forests to meet the expenses incurred in the locust campaign. This additional credit is added to the 300 million lire authorized by Legislative Decrees of the Lieutenancy Nos. 806 and 222 of November 23, 1945 and April 19, 1946 [see this *Bulletin* 1946, Nos. 3-4, p. 29 and Nos. 7-8, p. 73]. (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 21 maggio 1946, anno 87°, n. 117, p. 1102).

*** Presidential Legislative Decree No. 41 of June 22, 1946 authorizes a further expenditure of 800,000,000 lire to cover the cost of the locust campaign during the year 1946. (*Gazzetta Ufficiale della Repubblica Italiana*, Roma, 9 agosto 1946, anno 87°, n. 178, p. 1938).

*** By Presidential Legislative Decree No. 32 dated July 1, 1946, State contributions towards meeting the cost of citrus parasite control are increased. (*Ibid.*, 1° agosto 1946, n. 171, p. 1868).

Rumania * — By Ministerial Decree No. 929 of May 14, 1946 the common bean weevil (*Acanthoscelides obtectus* Say) is declared dangerous for the crops of the country.

All provisions laid down by Ministerial Decree No. 154.338 of June 7, 1934 relative to the import, export and transit of beans in Rumania remains in force.

The Departments contaminated by this parasite are declared infested. The relative control measures will be passed by Ministerial Ordinance.

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The first three chapters cover farming, sheep-rearing and the tree wealth of the region.
The author then studies the following subjects : —
Entomological fauna in relation to the flora and agriculture.
The present locust situation and possible breeding during the year.
Behaviour of swarms of *Schistocerca gregaria* ph. *gregaria* on the ' Piano salato ' (mining district at Dallòl).
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